

Coronagraphic Planet Finding with Energy Resolving Detectors

Completed Technology Project (2011 - 2015)



Project Introduction

We propose to build a 10,000 pixel MKID camera and integrate it with the Project 1640 coronagraph and the PALM-3000 adaptive optics system at the PaloMar 200-inch telescope. With some modifications to the Project 1640 system, this will be the world's first visible through near infrared planet finding coronagraph. Microwave Kinetic Inductance Detectors (MKIDs) are an emerging superconducting detector technology capable of resolving the energy and arrival time of single photons with no dark current or read noise, and applicable from X-ray to sub-millimeter wavelengths. Our instrument will use an MKID array optimized for observing planets in the optical through near-IR wavelengths. When integrated with the Project 1640 coronagraph, our instrument will provide optical and near-IR spectra of giant planets and serve as a testbed for future ground and space-based planet finding missions. The impact of this technology will span nearly all wavelengths and fields of astronomy. With their unique capabilities, broad wavelength coverage, and conveniently multiplexable design, MKIDs have the potential to replace traditional semiconductor based detectors. When paired with the high-contrast imaging from Project 1640, this instrument could have a profound impact on exoplanet research, one of the youngest and most intriguing fields in astrophysics. This project promises to not only generate revolutionary new technology, but also to help answer fundamental questions about life in our universe.

Anticipated Benefits

The impact of this technology will span nearly all wavelengths and fields of astronomy. With their unique capabilities, broad wavelength coverage, and conveniently multiplexable design, MKIDs have the potential to replace traditional semiconductor based detectors. When paired with the high-contrast imaging from Project 1640, this instrument could have a profound impact on exoplanet research, one of the youngest and most intriguing fields in astrophysics. This project promises to not only generate revolutionary new technology, but also to help answer fundamental questions about life in our universe.



Project Image Coronagraphic Planet Finding with Energy Resolving Detectors

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Organizational Responsibility	1
Primary U.S. Work Locations and Key Partners	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	2
Images	3
Project Website:	3

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

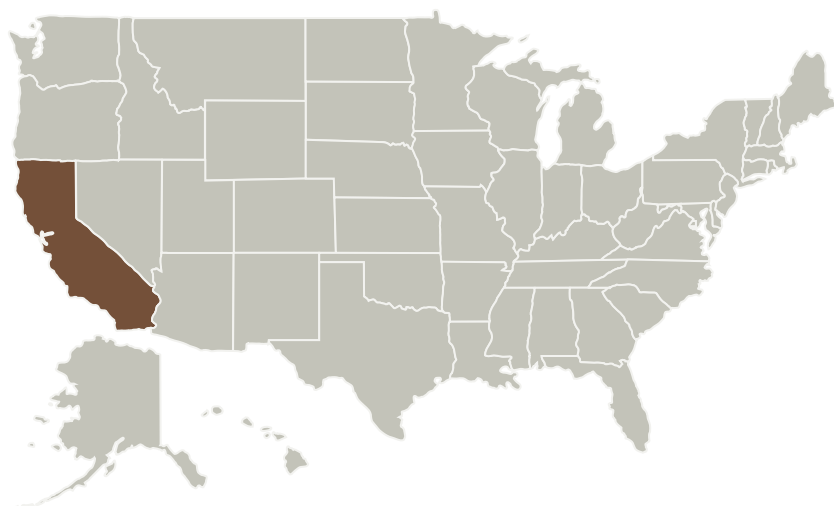
Space Technology Research Grants

Coronagraphic Planet Finding with Energy Resolving Detectors

Completed Technology Project (2011 - 2015)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
University of California-Berkeley(Berkeley)	Supporting Organization	Academia	Berkeley, California
University of California-Santa Barbara(UCSB)	Supporting Organization	Academia	Santa Barbara, California

Primary U.S. Work Locations

California

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

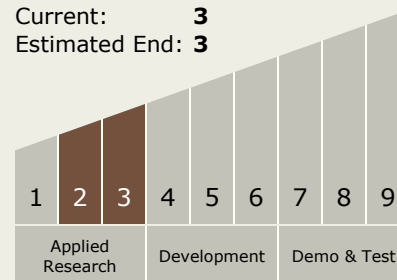
Benjamin A Mazin

Co-Investigator:

Seth Meeker

Technology Maturity (TRL)

Start: 2
 Current: 3
 Estimated End: 3



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Coronagraphic Planet Finding with Energy Resolving Detectors

Completed Technology Project (2011 - 2015)



Images



4271-1363119466895.jpg

Project Image Coronagraphic Planet
Finding with Energy Resolving
Detectors

(<https://techport.nasa.gov/image/1736>)

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>